of adaptations out of the natural selection of undirected variations, to use my colleague's language, may prove to be a dogma quite as unsupported by facts as the Lamarckian dogma of the inheritance of acquired characters. I long ago pointed out that a very large number of new characters in the hard parts of mammals are adaptive in direction from the beginning; I am very far from saying that *all* new characters are adaptive in direction; I only make this statement as to those characters I have had the opportunity of repeatedly observing.

I now challenge the zoologists to produce a single instance of a series of animals in which adaptive characters are being accumulated through the *selection* of undirected variations, *i. e.*, of variations which are thoroughly mixed up, in which *there is no law evident.* Such a series has never been produced by any one. Of course I bar from this challenge orthogenic changes of character under environmental influences. I refer to the *pure* Darwinian hypothesis. The hypothesis is still as Darwin left it, an ingenious working theory, awaiting either experimental evidence or evidence of any kind. How long this assumption will pass muster as based on observation it is hard to say. We await some paleontological Weismann who will smite it hip and thigh as the zoological Weismann smote Lamarck's assumption.

While the "philosophic zoologist" of to-day has made his choice, the philosophic paleontologist has also made his choice. The latter certainly does not find direction in the old teleologic sense, but quite as certainly he finds no evidence of such fortuity as will justify the use of the word *undirected* as furnishing materials for natural selection. The materials for natural selection are furnished by the *ensemble* of an enormous number of characters, each of which is a unit pursuing its independent history and fluctuating and mutating and moving in direct lines under laws which the philosophic paleontologist has proof of, but totally fails to understand. Consequently he assumes the agnostic position that there is some principle, or principles of direction, or better—to use Professor Morgan's own words —"unknown agencies," still to be discovered other than the principle of order coming out of fortuity.

Henry Fairfield Osborn

NELSON'S LOOSE LEAF ENCYCLOPEDIA.

To the Editor of Science: In February an article was published in Nelson's "Loose Leaf Encyclopedia" upon the Messina-Reggio earthquake, the authorship of which was credited to Mr. Frank A. Perret and myself. In justice to Mr. Perret, however, it should be stated that he had nothing whatever to do with the preparation of the article beyond furnishing the one item pertaining to the height of the "tidal" wave at Messina which is duly credited to him. The insertion of Mr. Perret's name as joint author was done by the publishers of the encyclopedia without my knowledge or consent, but thus far I have been unable to obtain any correction of their error.

E. O. Hovey

New York,
May 11, 1909

SCIENTIFIC BOOKS

General Physics. By Henry Crew. New York, The Macmillan Co. 1908.

A Text-book of Physics. Edited by A. Wilmer Duff. Philadelphia, P. Blakiston's Son & Co. 1908.

The publication of these two excellent text-books designed for college classes in physics illustrates the general dissatisfaction among college professors of physics with both existing text-books and accepted methods. There are many difficulties inherent in the teaching of physics and there are many points concerning which the best teachers are to a certain degree undecided. As physics is taught at the present time in most American colleges the time devoted to it is one year during each week of which there are three hours of lectures or class work, accompanied by five or six hours of laboratory work. In this time a student is supposed to cover the field of elementary mechanics, properties of matter and physics proper, including heat, light, etc. Within recent years a demand has arisen for text-books which should have more or less refer-

ence to the different classes of students following the course, the point being that stuents looking forward to engineering ostensibly need a text-book different in character from that best fitted for other students. The difficulties of satisfying these requirements by any one text-book are insuperable. At the very best the author must make certain compromises and must adapt his book to certain actual conditions, and to the classes with which he is most familiar. It is not an easy matter to prepare a text-book in physics which shall satisfy the obvious pedagogical requirements for physics as a subject in general education and at the same time meet the requirements mentioned above. It is not to be expected that all teachers of physics should feel satisfied with all text-books of physics, from the standpoint either of general purpose or of detail, but the two books under review are certainly admirable in many respects, and are sure to have a well-deserved popularity among American colleges.

The author of the present review is not certain as to the object of such an article. It certainly should not be to point out typographical errors, or even to refer to what may seem to him to be misstatements of facts or of theory. On the contrary, perhaps the best result may be secured by noting both the obvious facts concerning the book and the points by which each differs from other well known books.

Professor Crew's book is a beautiful piece of book-making; the paper, type, wood-cuts and binding are all that could be desired. It contains 515 pages, of which 182 are devoted to mechanics and properties of matter, 64 to wave motion and sound, 61 to heat, 115 to magnetism and electricity and about 100 pages, the rest of the book, to light. The balancing of the various subjects, as shown by this subdivision, is admirable. One would expect that this text-book would prove most satisfactory to any college class; the references to the historical development of the science are most interesting and inspiring; the various machines or experimental facts which are given as illustrations of the general theories are well selected and described with enthusiasm; in fact, the whole book is permeated with a certain charm thoroughly characteristic of all of Professor Crew's own enthusiasm as a teacher and investigator. Another excellent point about the book is the selection of problems. These contain not only useful arithmetical illustrations, but also questions which require the exercise of reasoning as apart from any use of formulæ or numbers. It is only in a few places that the author seems to introduce matter which is too far removed from the elementary character of the general book.

The text-book edited by Professor Duff is a compilation of seven sections prepared by different authors as follows: Mechanics, by Professor Duff himself; Heat, by Professor Guthe; Wave Motion and Sound, by Professor Hallock; Light, by Professor E. P. Lewis; Electricity and Magnetism, by Professor Goodspeed; Electromagnetic Induction, by Professor Carman, and Conduction of Electricity through Gases and Radioactivity, by Professor McClung.

In attempting to prepare a book in this manner there are no unavoidable difficulties provided the general editor is one who has certain executive powers, and certainly in this case the publishers are fortunate in having persuaded a man of Professor Duff's ability to assume the task. As is to be expected in such a compilation, there is a certain degree of inequality, but in this particular illustration it is reduced to a minimum. In fact, the work is admirably done from the standpoint of the general editor. The book contains 666 pages and is divided into the seven sections referred to; 177 being devoted to mechanics and properties of matter, 102 to heat, 45 to wave motion and sound, 143 to light, 154 to electricity and magnetism, including electromagnetic induction, 136 to conductivity of gases, etc. At the end of the various sections there are sets of problems which in the majority of cases are admirably selected. The illustrations are clear, but lack the charm of those of Professor Crew's book; the type and paper are satisfactory, although not so good as to demand special attention.

It is not easy to decide as to the class of students for which this book is designed, be-

cause in some ways the treatment is most elementary and in other chapters use is made of the calculus. The field covered is satisfactory on the whole, as is shown by searching in the various chapters for discussions of all the important general phenomena. It would not be difficult to refer to certain sections which might be omitted with profit, but on the whole there is little to criticize in this respect, for the rights of the individual teacher and author must be respected.

The success of any text-book in physics must be decided from its effect upon the mind of the students who use it. If they are taught by means of it to reason correctly, and if they learn a consistent view of the great phenomena of nature, it has accomplished its purpose. A great deal naturally depends upon the teacher, but certainly in the present case the authors of the text-book referred to above have done their full share.

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A Manual of North American Diptera. By Samuel W. Williston. Third edition, illustrated. New Haven, Conn., James T. Hathaway. 1908. Price, $4.00 postpaid. Pp. 405, duodecimo, cloth.

The much-desired third edition of Dr. Williston's manual was actually published and some copies distributed about August 28, 1908, but on account of the absence of the author on a fossil-hunting expedition in western Texas only a few copies were sent out until about the end of the year. It has, therefore, received but little notice in reviews up to the present time.

The book, like the preceding editions, is designed largely for beginners. It contains an introduction, a treatise on the anatomy of diptera, suggestions as to methods of collecting, preserving and studying the insects, some general remarks on the principles of classification, a synoptic table of the families and a series of chapters on the families. These last-mentioned chapters each include one family, giving in uniform style the following topics: definition of the family, characters of the larvæ, habits of larvæ and adults (often at some length), and table of genera based on adult characters. In a few cases the larvæ are to some extent subdivided in a separate table. Several of the chapters are written partly or wholly by other entomologists.

The illustrations form a new and conspicuous feature of the work, numbering nearly a thousand. While recent entomological literature has been drawn upon to some extent, a large proportion of the figures are new and drawn by Williston himself, representing an immense amount of labor on his part.

In the preface, after mentioning the successive publications in which he had attempted to outline the classification of North American diptera, the author states that he feels his work in this line completed with the present publication. Perhaps, for this reason, he has allowed himself to express his views and even his feelings to a greater extent than in former editions. Many passages might well be quoted, either as illustrating generalizations derived from thirty years of strenuous scientific work, or to illuminate points of disagreement between the author and certain younger dipterists. A very few selections must suffice.

Giantism in any group of animals is a specialization, and is, in general, an indication of approaching decadence. . . . No strong or dominant group of flies, like the Tachinidæ, Dolichopodidæ, Syrphidæ or Bombyliidæ, has ever had in the past a larger average bodily size than is found among their living representatives.

On the splitting of genera in the mosquitoes:

I fear even Desvoidy's shade would turn pale with envy in the contemplation of some of the proposed genera of the modern culicidologists.

On the "mere collector":

His labors are hardly more important than those of the microtomist who cuts up frogs' eggs and makes pictures of them.

In the matter of wing nomenclature the common system is wisely adhered to, while the Comstock (here called the Comstock-Needham) is illustrated in a page of wings. Unfortunately, the tabular exhibit of homologous terms is imperfect because Comstock's earlier designations are used. The fact that there are already three distinct forms of Comstock nomenclature in existence is an excellent rea-